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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>7</sup> :</b> <b>C05F 5/00, 17/00, C05C 9/00, C05F 11/00</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 00/15583</b> <b>(43) International Publication Date:</b> 23 March 2000 (23.03.00)
<b>(21) International Application Number:</b> PCT/GR99/00034 <b>(22) International Filing Date:</b> 10 September 1999 (10.09.99)  <b>(30) Priority Data:</b> 980100343 16 September 1998 (16.09.98) GR  <b>(71)(72) Applicant and Inventor:</b> NINOLAKIS, Markos [GR/GR]; 2 Salteli Str., GR-111 41 Athens (GR).		<b>(81) Designated States:</b> AL, AU, CN, CR, ID, IL, IN, JP, MX, TR, US, ZA, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>
<b>(54) Title:</b> SOIL IMPROVING BIOHUMIC FERTILIZER FROM OLIVE KERNEL  <b>(57) Abstract</b>  Production Methods of soil-improving biohumic fertilizer with aerobic biological compost treatment, humification of olive kernel selfsame or treated with agricultural rejects. Production Methods of soil-improving biohumic fertilizer from olive kernel with compost treatment, humification, selfsame or treated with agricultural rejects. My invention refers for the first time in the use of olive kernel for producing other than seed oil and kernel with controllable moisture and temperature values during composting and controllable humification using bags to avoid loss of humidity. The method was applied in selfsame olive kernel as well as composted with agricultural rejects. The results were proven to be very encouraging concerning the quality of the produced soil improving biohumic fertilizer.		

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**Soil improving biohumic fertilizer from olive kernel****TECHNICAL FIELD OF THE INVENTION**

5 My invention refers to materials and production method of stabilized soil-improving biohumic fertilizer with aerobic biological compost treatment, humifying, olive kernel selfsame or treated with agricultural rejects.

**CURRENT TECHNICAL LEVEL OF PRODUCTION METHODS-SURVEY**

10 In the olive oil production industry during the squash of the olives, olive kernel is produced which is the raw material for producing seed-oil and kernel residuals.

15 This process which is performed by seed-oil refineries produces toxic gases which pollute significantly the environment

20 The necessity of the olive oil refineries to reduce the volume of their liquid wastes, drives them to use a two-phased olive squashing method, which of course reduces significantly the volume of the liquid wastes but on the other hand renders the olive kernel unprofitable to seed-oil refineries because it reduces the concision of olive oil of the olive kernel to 2% from the usual 5-7%.

25 My invention solves this problem by transforming the olive kernel into soil improving biohumic fertilizer which can be used in the agricultural industry with improved method composting – humification.

30 The composting – humification of solid organics is an aerobic biological treatment of decomposed organic matter which is performed by microorganisms when suitable conditions occur. This process follows mainly two stages.

Combosting which is thermophilic and humification which is mesophilic or psychrophilic.

35 The major factors which influence the process of composting is the ratio C/N/P (Carbon / Nitrogen / Phosphorus), the porosity, the humidity, the ventilation, the PH and the temperature whilst humification is influenced by the chemical texture of the organic underlays which take place in the process.

40 In the first stage (composting) temperature rises up to 60-65 C due to the reaction of colonies of bacteria onto easily decomposable combinations such as sugar, proteins and fat.

45 The rise of the temperature contributes to the pasteurizing of the compost, the removal of all harmful microorganisms and the biodegradation of toxic combinations such as chloride organic and phenolic ones.

### EXAMPLE 1

Inside a bioreactor I placed 900 kg olive kernel, 80 kg grinded leaves and small branches (of olive tree) measured up to 1 mm thick, 20 kg urea, settling the humidity, by adding chlorine free water to 36%.

- 5 The bioreactor is an inclined rotating cylinder with inner fins and measurement instruments of temperature and humidity. The top is open.

The above mentioned mixture was homogenized by rotating the bioreactor with a rate of 10 revolutions per minute for a period of 10 minutes.

- 10 Then I left it still in order to start the exotherm bioreactions.

Within 20 hours the temperature had risen up to 65 °C. Every 12 hours for the first 72 hours humidity was measured and checked in order to be maintained to 36%, ( $\pm 2\%$ ), and rotated the bioreactor for 3 minutes every hour with a rate of 2 revolutions per minute, to prevent lack of oxygen into the compost which is vital

- 15 to the bioreactions.

Within 5 days composting was complete and the product was placed into 40 lt PE plastic bags with humidity 32% not sealed in favorable conditions for humification. In 40 days the material was completely humified. The final product of the humification is a stabilized soil improving organic humic fertilizer

- 20 completely deprived from phenols combinations which are included in olive kernel.

### EXAMPLE 2

Mixing 1820-kg olive kernel, 140-kg grinded leaves and small branches (olive tree), 40 kg urea, into the bioreactor rotated the mixture for 15 minutes to completely homogenize the compost and placed it in a pulp 3 meters long, 1,5 wide and 0,80 high in environmental conditions. During the whole process of composting humidity was 36% ( $\pm 2\%$ ) and this was accomplished by adding chlorine free water daily.

- 30 In 30 hours there was a rise of temperature which was stabilized to 60-65 °C for 6 days. After that temperature started to fall and when it reached 55 °C there was a stirring of the compost with a mechanical way in order to be ventilized. Within 18 hours temperature increased again to 60-65 °C for 6 days and eventually fell to 55 °C where a further stirring took place.

- 35 After 6 days stirring for ventilation took place again but the temperature of the mixture had dropped down to 45 °C

The maximum value of temperature after the last ventilation never exceeded 50 °C

- 40 The composted material stayed in environmental conditions for 2,5 months for humification. The final product was equivalent with that of Example1.

**CLAIMS**

1. Production method of soil-improving biohumic fertilizer with aerobic biological compost treatment, humification, olive kernel selfsame or treated with agricultural rejects.  
5
2. Production method composting humifying as stated above using the following materials  
85-95% weight olive kernel  
3-13% weight grinded leaves and small branches of olive tree  
10 2% weight urea
3. Production method composting as stated in (1) and (2) during which the stabilization of moisture to 32-40% and of temperature to 60-65 °C completes the process in 6 days.  
15
4. Production method humification as stated in (1) during which the composted material matures into bags with humidity 23-32% for 6 weeks.
5. Production method composting humifying as stated in (1) where the olive  
20 kernel is above 10% of the total weight of the compost.

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/GR 99/00034

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C05F5/00 C05F17/00 C05C9/00 C05F11/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C05F C05C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FR 1 526 020 A (GIACINTO GIALLOMBARDO ET AL.) 18 September 1968 (1968-09-18)	1, 3, 4
A	the whole document	2, 5
X	EP 0 718 397 A (TRATAMIENTO INTEGRAL DE ALPECH) 26 June 1996 (1996-06-26) claims column 4, line 16 - line 27 column 4, line 54 - column 5, line 30 column 6, line 3 - line 25	1
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

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# INTERNATIONAL SEARCH REPORT

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>DATABASE WPI Section Ch, Week 198927 Derwent Publications Ltd., London, GB; Class C04, AN 1989-194747 XP002123531 &amp; ES 2 002 555 A (SANCHEZ MORAL P), 16 August 1988 (1988-08-16) abstract</p> <p>----</p>	1
X	<p>DATABASE WPI Section Ch, Week 199231 Derwent Publications Ltd., London, GB; Class D16, AN 1992-251904 XP002123532 &amp; ES 2 028 497 A (DORSCH SERRANO F), 1 July 1992 (1992-07-01) abstract</p> <p>-----</p>	1,3,4
A		2,5

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GR 99/00034

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